ANALYSIS OF FINANCIAL RATIO TO PREDICT *FINANCIAL DISTRESS*: A COMPARATIVE STUDY BY USING ACCRUAL AND CASH-BASED APPROACHES
(Case Study on Automotive and Component Sub-Sector Companies Listed on Indonesian Stock Exchange Period 2011-2016)

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Abstract

The purpose of this study is to observe whether the analysis of accrual and cash-based financial ratio can be used correctly in predicting *financial distress*. This study uses samples such as financial reports from each automotives and components sub-sector companies listed on Indonesian Stock Exchange (BEI) in period 2011-2016. The dependent variable is *financial distress* and the independent variable are accrual and cash-based financial ratio. Data was analyzed by using discriminant analysis on *software* SPSS assistant.

The result of the study showed that the two financial ratios on accrual-based (WCTA, EBITTA, NITA) and cash-based (CFFOTA, CFFOS, IPPEPPE, CHWCTU, RPPETS, DITS, NetdebtTS) can be used to predict *financial distress* with accuracy percentage of accrual-based 95.6% and cash-based 85.3%. Afterward, the result of another hypothesis tests stated that the model of *financial distress* prediction from accrual-based financial ratio has more accurate prediction rate than cash-based financial ratio.

Keywords: *Financial Distress*, Accrual-based, Cash-based, Grover Model, Cash Flow Ratio

INTRODUCTION

Competition among industries in the domestic market becomes more solid. In 2013, there was an economic crisis in Indonesia listed 8.38%, the highest rate since the inflation occurred in 2008. It was caused by the rising of fuel (BBM) price which was rising and falling unstable, resulting in an increase in the price of commodity goods in all aspects of the needs. This condition was significantly influential, particularly in the transportation sector where as described in portal Detik *Finance* that the public transportation tariff contributed to the inflation of 1.75%. In 2014, automotive sales declined 1.78% or 21,873 units from the previous year's sales. Afterward in 2015, the automotive sales in domestic market declined to 17.61% with the total sales of 1,013,291 units, declining from the previous year's sales.

In 2015, there was a decline of greatest sales after 2014. Commonly, the selling decline occurred due to the proportion of public consumption of automotive commodity was reduced due to the impact of inflation in 2013. Consequently, there were several automotive companies that suffered a decline due to the selling decline that continue to occur each year. In general, *financial distress* (financial failure) can be interpreted as the company cannot pay its financial obligations at maturity that can cause liquidity difficulties so as to enable the beginning of bankruptcy (Rudianto, 2013).

The analysis of financial ratio can be conducted through two accounting bases, namely the accrual basis and cash basis. There are several accrual-based measurement models compiled from various financial ratios to predict *financial distress*. The models have been tested by Prihanthini and Sari (2013) suggesting that there are significant differences between Grover, Altman *Z-Score*, Springate, and Zmijewski models. And the highest level of accuracy achieved by Grover model, then followed by Springate, Zmijewski, and the last Altman *Z-Score* models. In addition to predictions with the models, cash-based financial ratio analysis will also be used to predict potential for *financial distress*. In a previous study, Sari and Utami (2009) stated that *financial distress* prediction model using statistically fit cash flow and CFFOTA, CFFOS, IPPEPPE, CHWCTU, RPPETS, DITS and NetdebtTS ratios have a significant influence in predicting *financial distress*. This study aims to: (1) discover the ability of financial ratio analysis using Grover model (accrual basis) in predicting the potential of *financial distress*, (2) discover the ability of financial ratio analysis using cash flow ratio in predicting the potential of *financial distress*, and (3) discover the financial ratio analysis which has better *financial distress* prediction between Grover model (accrual basis) and cash ratio (cash flow basis) in automotives and components sub-sector listed in Indonesian Stock Exchange period 2011-2016.

LITERATURE REVIEW

Financial Distress

In Rudianto's opinion (2013), *financial distress* means that a company cannot fulfil its obligation at maturity, while the total asset value exceeds its total ability. And if the *financial distress* continues during the years, it will cause bankruptcy.

An indicator that a company can affect the condition of *financial distress* may vary according to some studies. According to Amalia (2006), a company may be categorized as having financial difficulties if: (1) for two consecutive years experiencing net profit and negative value of equity book, and (2) for more than one year not paying dividends.

Accrual Basis

In assessing the bankruptcy of a company, there were various studies produced various models of bankruptcy assessment. One of the study is Grover model. This model is created by Jeffrey S. Gover (2001) by assessing and re-designing *Z-Score* model of Altman (1968). Grover took variables of X_1 and X_3 from *Z-Score* formulation then added other variable of *Return On Asset*.

Cash Basis

Quoted from Sari and Utami research (2009), cash flow ratio is selected as a *financial distress* prediction tool because information from cash flow statement is rarely used in assessing financial performance, particularly in predicting *financial distress*. In a business entity that is not subject to *financial distress*, its cash flow ratio is larger and the trend tends to increase. While companies experiencing *financial distress* have smaller cash flow ratio and the trend tends to decline before the companies are experiencing *financial distress*.

METHOD OF THE STUDY

The type of research is quantitative research that is inductive, objective, and scientific research in which the data obtained in the form of numbers (values) or statements assessed and analyzed by statistical analysis. This study uses data collection methods in the form of documentation of financial statements of automotive and component sub-sector companies that have been available on Indonesian Stock Exchange website since 2011-2016. The financial statements that have been obtained will be analyzed using SPSS to determine the normality of the data and its significance in this study. Later, it will be conducted a literature study in the form of analysis of accrual-based and cash-based financial ratios using Grover model and cash flow ratio to match the results of this study with existing theory.

Table 3.1. Definition of Operational Variables

Variables	Indicators	Scale	Instruments
Dependent Variable: *Financial Distress* (Y)	*Financial distress* *Non-financial distress*	Nominal	*Z-Score* is the result of *financial distress* prediction model
Independent Variable: Accrual-based Financial Ratios (X_1)			
- WC/TA	*Working Capital to Total Assets*	Financial Ratio	Financial Statement
- EBIT/TA	*Earning before Interest and Taxes to Total Assets*	Financial Ratio	Financial Statement
- NI/TA	*Net Income to Total Assets*	Financial Ratio	Financial Statement
Cash-based Financial Ratios (X_2)			
- CFFO/TA	*Cash Flow from Operation to Total Aseets*	Financial Ratio	Financial Statement
- CFFO/S	*Cash Flow from Operation to Sales*	Financial Ratio	Financial Statement
- IPPE/PPE	*Investment in Plant, Property, and Equipment to Plant, Property, and Equipment*	Financial Ratio	Financial Statement
- CHWC/TU	*Changes in Working Capital to Total Used Fund*	Financial Ratio	Financial Statement
- RPPE/TS	*Retirement in Plant, Property, and Equipment to Total Source of Fund*	Financial Ratio	Financial Statement
- DI/TS	*Debt Income to Total Source of Fund*	Financial Ratio	Financial Statement
- Netdebt/TS	*Net Debt to Total Source of Fund*	Financial Ratio	Financial Statement

Source: Processed Data

Discriminant analysis is used to classify individuals into one group of two or more groups. The steps in conducting discriminant analysis in this study is equivalent to the research that had been done by Ambari (2014) :

1. The significant test of discriminant variable to accrual-based (X_1) and cash-based (X_2) financial ratios of the *financial distress* (FD) and *non-financial distress* (Non-FD) is conducted by using Wilk's Lambda test. If the number of Wilk's Lambda is close to 0, then the data of each group tends to be different, but if close to 1, then the data of each group tends to be the same. Another way to test independent variables is by F test. Since knowing the significance values of Wilk's Lambda test can be converted into F ratio. F test can be seen from Sig column on Wilk's Lambda test table. If the significance value (Sig.) > 0.05, meaning there is no statistically different between groups. If the significance value (Sig.) < 0.05, meaning there is statistically different between groups.
2. Furthermore, the simultaneous analysis of these financial ratios is used as independent variables in discriminant function in each accrual-based and cash-based financial ratios. So, the equation considers as follows:

$$Z\text{-}Score = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_n X_n + ...$$

Notes:

Score = *discriminant score*

α = *intercept*

β = *parameter*

X = independent variables of the first, second, and so on

Z-score value of each of accrual and cash-based financial ratios derived from this discriminant function is used as *cutting score* to classify the automotive company experiencing *financial distress* and *non-financial distress.*

3. Accurate test of discriminant function uses *Chi-Square* analysis. This analysis is used to test the diffent capabilities of each model in predicting. Decision making is obtained by comparing *Chi-Square* count with *Chi-Square* table. If counting *Chi-Square* > *Chi-Square* table, there is a classification difference between the accrual and cash-based predictions model. Another way to draw conclusions from this analysis is to look at the Sig. column in *Chi-Square* test, if the significance value (Sig.) > 0.05, there is no classification difference between prediction models. However, if the signifance value (Sig.) < 0.05 there is a difference between the prediction model.

RESULT OF THE ANALYSIS

The first hypothesis tested the effect of accrual-based financial ratio (X_1) to *financial distress* (Y). The discriminant analysis was firstly conducted by testing the equality of the mean value vector of accrual-based financial ratio variable of the two groups (*financial distress* and *non-financial distress*). The equality test of mean value vector can be done by F test on Wilk's Lambda. The F test can be viewed in *Sig.* column. If *Sig.* > 0.05, it means that there is no any difference in the group, while *Sig.*< 0.05 means that there is statistically difference in the group. The result of discriminant test of *Equality Test* can be viewed in Table 4.1.

Table 4.1. Test of Wilk's Lambda on Accrual-based Financial Ratio

Equality Test of Group Means

	Wilks' Lambda	F	df1	df2	Sig.
WCTA	.617	43.488	1	70	.000
EBITTA	.519	64.934	1	70	.000
NITA	.543	58.799	1	70	.000

In the table of *Test of Equality of Group Means* it was viewed that significance values of Wilk's Lambda for accrual-based financial ratios (WCTA, EBITTA, NITA) is 0.00< 0.05, meaning that each variable will give different decision making on the dependent variables.

Table 4.2. Discriminant Analysis on Accrual-based Prediction Model

Canonical Discriminant Function Coefficients

	Function
	1
WCTA	4.080
EBITTA	29.938
NITA	-22.592
(Constant)	-1.349

Unstandardized coefficients

Discriminant function coefficient was obtained from the test table of *Canonical Discriminant Function Coefficient*. Based on the table of 4.2 above, the equality or discriminant function of accrual-based financial ratio could be arranged as follows:

***Z-Score* = -1,349 + 4,080WCTA + 29,938EBITTA -22.592NITA**

When viewed from the coefficient value, WCTA and EBITTA are positive, while the NITA and the constants are negative. The explanation of the function is that the *Z-score* value is directly proportional to WCTA and EBITTA, while inversely proportional to NITA. The greater the value of *Z-Score*, the greater the value of WCTA and EBITTA, but the value of NITA would be smaller. The value generated by *Z-score* on the prediction model will be used to classify companies experiencing *financial distress* and companies that do not experience *financial distress*. The results of the accuracy test classification of the model are as follows:

Table 4.3. Classification Accuracy Test of Accrual-based Prediction Model

Classification Results[a,c]

	Y		Predicted Group Membership		
			.00	1.00	Total
Original	Count	.00	57	2	59
		1.00	1	8	9
	%	.00	96.6	3.4	100.0
		1.00	11.1	88.9	100.0
Cross-validated[b]	Count	.00	56	3	59
		1.00	1	8	9
	%	.00	94.9	5.1	100.0
		1.00	11.1	88.9	100.0

a. 95.6% of original grouped cases correctly classified.
b. Cross validation is done only for those cases in the analysis. In cross validation, each case is classified by the functions derived from all cases other than that case.
c. 94.1% of cross-validated grouped cases correctly classified.

Based on table 4.3 regarding on *Classification Result*, it showed that the classification accuracy on accrual-based prediction model is 95.6% (code a). According to the accrual-based prediction model observed 95.6% of 72 samples are put into groups in line with the original data studied. It showed that data classified correctly above 50% or a minimum limit of correct classification accuracy (Zu'amah, 2005). The result of analysis might answer the hypothesis 1, that accrual-based financial ratio effected the prediction of *financial distress* in a company.

Second hypothesis tested the effect of cash-based financial ratio (X_2) to *financial distress* (Y). Here is the discriminant test result of *Equality Test* of cash-based financial ratio as in Table 4.4.

Table 4.4. Test of Wilk's Lambda on Cash-based Financial Ratio

Equality Test of Group Means

	Wilks' Lambda	F	df1	df2	Sig.
CFFOTA	.756	22.614	1	70	.000
CFFOS	.971	2.057	1	70	.046
IPPEPPE	.991	.646	1	70	.024
CHWCTU	.934	4.913	1	70	.030
RPPETS	.928	5.445	1	70	.023
DITS	.989	.764	1	70	.035
NetDebtTS	.994	.406	1	70	.026

Table of *Equality Test of Group Means* above presented that significance value of Wilk's Lambda for cash-based financial ratios (CFFOTA, CFFOS, IPPEPPE, CHWCTU, RPPETS, DITS, NetdebtTS) by using F test is averaged below 0.05, meaning the data of each group of cash-based financial ratios can be used as a differentiator in determining the value of the dependent variable. Furthermore, discriminant analysis can be applied to determine the discriminant function. The following calculation result of discriminant function coefficients of each accrual-based prediction model such as table 4.5.

Table 4.5. Discriminant Analysis of Cash-based Prediction Model

Canonical Discriminant Function Coefficients

	Function
	1
CFFOTA	17.767
CFFOS	-6.628
IPPEPPE	1.548
CHWCTU	.411
RPPETS	.648
DITS	-.619
NetDebtTS	.206
(Constant)	-.850

Unstandardized coefficients

Based on Table 4.5 *Canonical Discriminant Function Coefficient*, the equality or function of accrual-based financial ratios can be arranged as follows:

***Z-Score* = -0.850 + 17,767CFFOTA – 6,628CFFOS + 1,548IPPEPPE + 0,411CHWCTU + 0,648RPPETS – 0,619DITS + 0,206NetDebtTS**

Considering the coefficient values, ratios of CFFOTA, IPPEPPE, CHWCTU, RPPETS, and NetdebtTS have positive values, while constant values, CFFOS and DITS, have negative values. The explanation of the function is that *Z-score* value is directly proportional to CFFOTA, IPPEPPE, CHWCTU, RPPETS, and NetdebtTS, while inversely proportional to CFFOS and DITS. The greater the value of *Z-Score*, the greater the value of CFFOTA, IPPEPPE, CHWCTU, RPPETS, and NetdebtTS, but the CFFOS and DITS values will be smaller. The value generated by *Z-score* on the prediction model will be used to classify companies experiencing *financial distress* and companies that do not experience *financial distress*. The results of the classification accuracy test of the model are as follows:

Table 4.6. Classification Accuracy Test of Cash-based Prediction Model

Classification Results[a,c]

Y			Predicted Group Membership		
			.00	1.00	Total
Original	Count	00	52	7	59
		1.00	3	6	9
	%	00	88.1	11.9	100.0
		1.00	33.3	66.7	100.0
Cross-validated[b]	Count	00	51	8	59
		1.00	3	6	9
	%	00	86.4	13.6	100.0
		1.00	33.3	66.7	100.0

a. 85.3% of original grouped cases correctly classified.

b. Cross validation is done only for those cases in the analysis. In cross validation, each case is classified by the functions derived from all cases other than that case.

c. 83.8% of cross-validated grouped cases correctly classified.

Based on Table 4.6 regarding on *Classification Result*, it showed that classification accuracy of cash-based prediction model is 85.3% (code a). It means that according to accrual-based prediction model, 85.3% of 72 samples observed were put into groups suitable with the original data studied. Based on the analysis result, it can be drawn a conclusion that cash-based financial ratios influence the prediction of early *financial distress* in a company.

After observing all discriminant analysis, an accuracy test of difference of both accrual-based and cash-based prediction models using *Chi-Square* was conducted. Here is the result of *Chi-Square* test presented in Table 4.7.

Table 4.7

***Chi-Square* Test**

	Value	Df	Asymptotic Significance (2-sided)
Pearson Chi-Square	2670.000[a]	2583	.114
Likelihood Ratio	495.205	2583	1.000
Linear-by-Linear Association	.486	1	.486
N of Valid Cases	72		

a. 2688 cells (100.0%) have expected count less than 5. The minimum expected count is .01.

In Table 4.7 of *Pearson Chi-Square*, it was viewed that *Asymp. Sig.* value is 0.114. Since *Asymp. Sig.* value is 0.114 > 0.050, it can be drawn a conclusion that H_0 is accepted, meaning that there is a correlation between accrual-based and cash-based financial ratios. It means that accrual-based financial ratios are different with cash-based financial ratios.

CONCLUSION

Based on the purpose of the study and also the result and discussion explained in the previous chapter, it can be drawn a conclusion that:

1. Analysis of accrual-based financial ratios (WCTA, EBITTA, NITA) can be used to predict *financial distress*. It is proved by the accuracy test of accrual-based prediction model showing 95.6% of the studied samples classified correctly.
2. Analysis of cash-based financial ratios (CFFOTA, CFFOS, IPPEPPE, CHWCTU, RPPETS, DITS, NetdebtTS) can be used to predict *financial distress*. It is proved by the accuracy test of cash-based prediction model showing 85.3% of the studied samples classified correctly.
3. Analysis of accrual-based financial ratios have more accurate prediction levels than the analysis of cash-based financial ratios. It is proved by the accuracy test of each prediction model showing the explanations of accrual-based financial ratios that have

prediction accuracy 95.6%, greater 10.3% than cash-based financial ratios that have prediction accuracy 85.3%.

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